WORKING PAPER
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BANKING STRUCTURE AND PERFORMANCE

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WP 792-75 June 1975

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This paper was originally completed in February 1975 as a part of the doctoral program of Mr. Nam.

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I. Introduction

The major economic rationale for regulation of commercial banks is said to be (1) protection of depositors and (2) securing the economic well-being of the commercial banking system and hence of the economy at large.[1] Among the above two objectives, the latter seems to weigh heavier than the former. The argument is essentially based on the belief that bank failure is socially more costly than is the failure of other types of enterprise. The failure of a bank causes losses to depositors not only, as are the cases in other industries, to stockholders. It may lead to depositors' distrust in banks and disruption of checking mechanism and borrowing channels. Thus, producer protection philosophy seems to be fairly evident in the intent of the commercial bank regulation. The regulatory framework may be divided into three categories: regulation of (1) entry and branching (2) prices, and (3) portfolio management. All these forms of regulation seem to be formed more with the producer protection in mind rather than depositor protection.[2]

On the other hand, in December 1971, the President's Commission on Financial Structure and Regulation (the Hunt Commission) recommended a variety of structural changes in the financial market.[3] The basic concern of the Commission was the welfare of the consumers who both save and borrow. The Commission believes that greater flexibility and operational freedom in the financial structure will improve allocation of resources to the nation's economic and social needs, and encourage better services, greater efficiency and possibly lower prices. Items of their recommendation include allowing thrift institutions statewide branching, removing

restrictions on the office locations based on geographical or population factors, granting savings & loan associations and mutual savings banks a widened range of loan and investment power and permission to offer wider variety of time & savings deposits, and removal of price regulation. What the Commission recommended was basically a change toward less regulation or a shift of regulatory basis from the producer protection to the consumer protection. Underlying to this shift is the emphasis on the economic efficiency or performance rather than the concern with the potential cost of bank failures.

This paper is addressed to the question whether or not substantial gain in economic performance will be promised through the recommended structural changes in the financial market. The only way of answering the question seems to be observing the real world and seeing how bank performance is influenced by the specific regulations and by the different market structures.

The underlying theory, problems in the empirical studies and the alternative measures of market structure employed in this paper are presented, and the impacts of bank organization variables on performance are briefly discussed in Section II. In Section III, the performance measures and the estimating equations are formulated, the results being presented in Section IV with explanations. The paper finishes with summary and conclusions in Section V.

II. Market Structure and Bank Organization

1. The Theory and Troubles with Empirical Studies

Economic theory suggests that market structure plays an important role in determining business conduct, which, in turn, ultimately determines the quality of industrial performance. Unfortunately the actual pattern of market conduct is not easily observed to permit us to establish empirically a meaningful relation between structure and market conduct, or between market conduct and performance. Thus, we are forced to test directly for net associations of market structure to market performance, leaving the characteristics of the implied linkage of conduct substantially unascertained.

It is believed that the larger the number of competitors in the market, the greater the difficulty of maintaining collusive behavior, the more easily such behavior can be detected, and the greater the possibility of concious parallelism. 'Concentration' is employed in various models as an empirical counterpart of the 'number of sellers' in a market. When firm size distributions are radically different and there exists firms that are only marginally engaged in the business concerned, then the simple counting of sellers become useless in predicting market behavior.

Empirical work in this field has suffered from an inadequate delineation of market areas. Combinations of ad hoc reasoning and convenience of data have produced most of the area definitions.[4] It is thought that demand deposits, small time and savings deposits and most small loans are in the local market. Large size time & savings deposits and loans to

intermediate size borrowers are in the regional market, while large loans to large businesses are in the national market. However, this general statement does not provide any meaningful guidelines in identifying each market area.

Furthermore, a commercial bank is a multi-product firm. For the structure-performance analysis to be meaningful, the construction of separate market boundaries should be made for each line of commerce – demand deposits, time & savings deposits, various types of loans, etc. For example, the gross concentration measures, which are widely used in the empirical literature, are not valid for examining any particular bank output market, since in particular lines of commerce we have different number and size distributions of sellers. Thus, we are faced with the problem of delineating separate markets for each line of commerce, as well as the problem of defining separate lines of commerce.

This paper explores the impact of market structure on the performance of commercial banks in Massachusetts and New Hampshire. Since these two states are contiguous and in the same federal reserve district, we can assume that banks in both states are operating in the same regional market.[5] Thus, in this paper, we will be concerned only with local markets. However, since we are not sure how far the local market boundaries reach for each line of commerce, several alternative market delineations will be considered – town or city, county and standard metropolitan statistical areas (SMSA's). It is hoped that the estimated equations will define the relevant market boundaries. In this paper, only three lines of the commercial banking business are considered – demand deposits, time &

savings deposits, and total loans. This rather aggregate level of disaggregation (forced by the lack of data), though not satisfactory, is certainly better than nothing.

2. Measures of Market Structure

A fundamental problem with the widely used concentration ratio is that it describes only one point on the entire size distribution of sellers.[6] Another measure of concentration, the Herfindahl Index, has the advantage of incorporating more information about the size distribution of sellers. If we let S_i denote the i^{th} firm's share of the market with n sellers, then the Herfindahl Index, H, is measured as

$$H = \sum_{i=1}^{n} S_i^2$$

M.A. Adelman suggested the 'numbers-equivalent', NQ, as a concentration measure, where $NQ = {}^{1}/_{H}$. This is the number of equal-sized sellers that would generate the same Herfindahl Index in the market concerned. The measures of market structure used in this paper are as follows:

(1) Number of Sellers

For each hypothesized market – town or city, county and SMSA – competing firms are counted. For demand deposits, only commercial banks are counted, while mutual savings banks and savings & loan associations as well as commercial banks are included for time & savings deposits and loans. Branch offices headquartered in other markets are counted as independent banks. However, when a bank with the main office in another market has more than one branch offices in the market concerned, these

offices in total are counted as one; they are assumed to represent only one independent decision-making unit.

(2) Concentration Ratio

Concentration ratios are calculated for each county and SMSA market. Since there are few financial institutions in most towns or cities, concentration ratios in these markets are considered to be meaningless. For demand deposits, one-, two-, and three-firm concentration ratios are constructed, while two-, three, and four-firm concentration ratios are computed for time & savings deposits. Firms in the time & savings deposit business, as noted above, include mutual savings banks and savings & loan associations as well as commercial banks.

For loans, separate concentration ratios are not constructed. Instead, deposit concentration ratios are used as a proxy, since (a) composite loan concentration ratios may not be reliable because of the aggregation of different types of loans and (b) concentration in loan markets ultimately comes from the deposit concentration.

(3) 'Numbers-Equivalent'

'Numbers-equivalent', Adelman's measure of concentration, defined as the reciprocal of the Herfindahl Index, is calculated. The definitions of firm and market are exactly the same as those used to compute concentration ratios.

(4) Density of Banking Outlets

To some extent, existing bank size and locational distribution is the reflection of the banking demand. However, the general demand force

may be different in different markets. Total market demand for banking services may well be approximated by the population size or total income generated in the market. Thus, population or income of the market divided by the number of banking outlets may be a fairly reasonable measure of the demand force faced by individual banking units.

In addition, given the retail characteristics of banking, 'convenience' or ease of access to banking outlets can be considered as an important attribute or quality of banking service. For two markets of the same size, the one with lower urbanization, usually a sparcely populated market with fewer public transportation means and less geographical mobility will generally need more banking offices for a reasonable degree of 'convenience' or easiness of access to banking outlets.

Thus, the following Cobb-Douglas type demand equation for banking outlets is estimated for county and SMSA markets.[7]

$$N_{BO} \text{ or } N_{FO} = a \cdot (POP)^{\alpha} \cdot (UB)^{\beta}$$

where N_{BO}, N_{FO} : number of commercial bank offices and thrift institution (commercial banks, mutual savings banks and savings & loan associations) offices, respectively,

POP : population of the market in thousands as of the end of 1970.

UB : degree of urbanization measured by the per cent of urban population, and

a, α, β : parameters.

The regression results for 24 sample county markets are as follows (values in parentheses being t-statistic).

$$\text{Log } (N_{BO}) = -0.765 + 0.955 \text{ Log (POP)} - 0.178 \text{ Log (UB)} \qquad R^2 = 0.955$$
$$\qquad\qquad (-3.9) \quad (14.1) \qquad\qquad (-2.3)$$

$$\text{Log } (N_{FO}) = -0.479 + 0.956 \text{ Log (POP)} - 0.121 \text{ Log (UB)} \qquad R^2 = 0.971$$
$$\qquad\qquad (-3.0) \quad (16.9) \qquad\qquad (-1.9)$$

The fitted values of N_{BO} and N_{FO} can be interpreted as the 'required' number of banking outlets for the same strength of demand and the same level of consumer 'convenience' as the average market. Therefore,

$DS_B = 100 \ (N_{BO}/\hat{N}_{BO})$

$DS_F = 100 \ (N_{FO}/\hat{N}_{FO})$ are employed as demand variables for banking outlets. Banks operating in markets of low DS_B or DS_F are expected to have strong market power.

For town or city markets, the density is just defined as the size of population in thousands per office, ignoring the degree of urbanization.

3. Bank Organization

(1) Size of Bank

The effect of pure bank size on competition is not a priori clear. Some authors argue that, as a measure of market power, market share should be closely associated with how sensitive an individual competitor is to the behavior of the other banks in his market. His competitive response is supposed to be inversely related to the market share. Thus, the higher the market share, the larger the bank size in a given market, the more the market power and the higher the prices of bank services.

This 'market share hypothesis' runs directly into the 'scale economy hypothesis' which says that larger firms can undercut smaller firms because of favorable costs. The latter hypothesis raises two questions, the direct answers to which are beyond this paper. (a) The existence and magnitude of economies of scale in banking, and (b) true business objective function adopted by commercial banks – Are they profit maximizers or sales maximizers, in the short run or in the long run?

(2) Number of Branch Offices

Branch banks seem to create or be associated with monopoly power. With many branch offices scattered in many markets or in a market which is not exactly overlapping for the offices, a branch bank may have a greater variety of competitive strategies. For example, it might more effectively use a 'loss-leader' strategy by cutting prices in a competitive market, while exploiting monopolistic markets.

Unit banks may set limit prices taking account of the potential entry.[8] For unit banks, the potential injury from rival entry is far greater than is faced by branch banks, since the probability of having rival entries in all the markets where the offices of a branch bank are operating, is lower. The riskiness of unit banks is considered to be essentially coming from the importance of geographical location as a product differentiation which can easily be taken by entering rivals, and the relative unimportance of other aspects of service quality.

Turning to other aspects of branch banking, it is generally believed to be more expensive than unit banking. Many operations which might be consolidated under one roof must be duplicated in each branch. However,

not all of the higher cost is social waste, since much of it is associated with services of social value. Furthermore, the branch system provides for mobility of funds between offices allowing more efficient use of the available funds.

III. Performance Measures

Performance variables considered in many studies include prices of banking services, cost of banking, asset portfolio and earnings.[9] Given the profit maximization as the corporate objective, the major concern of the industrial economics has been directed to the profitability. In this paper, prices of three basic banking services, total operating cost and profit rate are employed as performance variables. To see the relations between these variables, the following objective function is specified.

$$\text{Max } E = TR - TC$$

$$= I\,(r_I - C_I - C_I^{IL}) + L\,(r_L - C_L - C_L^{IL}) - DD\,(C_{DD} + C_{DD}^{SV} + r_{DD})$$

$$-TD\,(C_{TD} + C_{TD}^{SV} + r_{TD}) - ND\,(C_{ND} + r_{ND})$$

$$\text{subject to } CS + I + L = DD + TD + ND = A_V$$

where E, TR, TC : total earnings before tax, total revenue and total costs, respectively.

A_V, CS, I, L : total available funds (total assets minus fixed assets), average cash holding, investments on securities, and loans, respectively.

DD, TD, ND : composition of available fund sources; average holdings of demand deposit, time & savings deposits and non-deposit fund, respectively.

r_I, r_L, r_{DD}, r_{TD}, r_{ND} : average interest rate on securities, loans, demand deposit, time & savings deposits and non-deposit fund, respectively. (Service charge on demand deposits being considered as negative interest)

C_I, C_L, C_{DD}, C_{TD}, C_{ND} : average handling cost associated with one dollar of security, loan, demand deposit, time & savings deposits and non-deposit fund holdings, respectively.

C_I^{IL}, C_L^{IL} : average illiquidity cost per dollar of security and loan holdings for given asset and liability portfolios, respectively.

C_{DD}^{SV}, C_{TD}^{SV} : average net cost of providing non-conventional services as compensations for one dollar of provided fund of demand deposit and time & savings deposits, respectively.

(1) Prices of Banking Services

Of the above five prices associated with banking business, the security prices are determined exogenously outside of commercial banks, that is, $r_I = \bar{r}_I$. Meanwhile, the interest rate on non-deposit funds is determined by general capital market conditions as well as the prospect of the bank. Thus, only the remaining three prices are considered to reflect the competitiveness of the market. Since we are concerned with the average interest rate, the differences in the composition within each line of commerce must be taken into account if there are distinctive subcategories as is the case with time & savings deposits and loans. Thus, to test whether market structure has any significant impact on price competition, the following price equations are estimated.

r_{DD} = f (bank organization, market structure)

r_{TD} = f (time & savings deposit composition, bank organization, market structure), and

r_L = f (loan composition, bank organization, market structure).

(2) Operating Cost

Profit maximizing banks who are, under the present regulation, unable to attract customers by using deposit rates as a competitive weapon, have no alternative but to use non-price forms of rivalry. All the empirical studies in this field have looked over this obvious direction of behavior. Even in loan business, especially in commercial loans, where there is no price ceiling, price competition has occasionally been observed, by some authors, to be non-existent. This phenomenon is believed to be more evident when commercial banks do not face strong competition from other thrift institutions.

Non-price forms of rivalry include advertising, the proliferation of branches, higher service quality, and provision of many non-conventional services rendered by safe deposit, trust, customer computer service and other non-banking departments. As shown in (Table 1), the non-conventional services, mostly provided to deposit and loan customers, have incurred huge costs during each of the recent three years. It suggests that commercial banks actively engaged in non-price competition will incur heavy expenses in the form of C_{DD}^{SV}, C_{TD}^{SV} and other costs. Thus, to detect the impact of market structure on the non-price form of rivalry, the following cost equation is estimated.

$$TC^{*}/A_{V} = f \text{ (asset portfolio, composition of fund sources, bank organization, market structure)}$$

(Table 1) Net Income from Non-Conventional Services

	Year	Banks with Deposits up to $ 50 M	Banks with Deposits between $ 50-200 M	Banks with Deposits more than $ 200 M
Safe Deposit	1971	-14.3	-22.2	-16.9
Department (% of revenue, before occupancy expense)	'72	-17.7	-14.0	-22.8
	'73	-21.8	-16.6	-15.2
Trust Department	'71	-33.7	-21.0	-6.4
(% of expense)	'72	-34.3	-17.6	-7.1
	'73	-35.2	-19.9	-6.3
Computer Service	'71	-26.8	-23.9	-43.2
Department	'72	-33.8	-17.3	-35.4
(% of revenue)	'73	-33.4	-26.2	-29.0
Non-Banking Service	'71	-39.2	-23.7	-7.2
Departments	'72	-35.7	-28.1	10.7
(% of expense)	'73	-35.5	-22.2	-5.4

Sources: Functional Cost Analysis 1971-73, Federal Reserve Bank of Boston

Since we are concerned only with the significance of non-price competition, the estimated cost TC^* is net of fixed costs and interest payment on time & savings deposits and non-deposit funds. Most of the banking services are provided in relation to the asset acquiring and liability or capital creating processes. Thus, asset portfolio and composition of the bank fund sources are included as explanatory variables to capture the differential cost conditions due to the varying banking operation.

(3) Profit Rate

Profit is the ultimate result of the management reaction to the market: the result of price setting and cost incurring or saving decisions. Assuming a correspondence of management reaction to the market structure, even though it may not be precise, we expect that profit will be affected by the market structure.

If there is no regulatory constraints, a bank with a profit maximizing objective will set prices, incur costs, and, accordingly, choose combination of DD, TD and ND such that

$$\frac{\partial E}{\partial DD} = \frac{\partial E}{\partial TD} = \frac{\partial E}{\partial ND} \quad .$$

Since commercial banks have fairly large discretion in their construction of asset portfolio, we expect that, for a given liability and capital portfolio, a profit maximizing bank will adjust their asset portfolio such that

$$\frac{\partial E}{\partial CS} = \frac{\partial E}{\partial I} = \frac{\partial E}{\partial L} \quad .$$

However, commercial banks are not free to set any prices on their deposits. The regulatory constraint imposes that

$$r_{DD} \leqq 0 \quad \text{and}$$

$$r_{TD_{ij}} \leqq \bar{r}_{TD_{ij}}$$

where $\bar{r}_{TD_{ij}}$ is the maximum interest rate payable on type i of time & savings deposit with maturity j.

If we assume that the first order condition for optimum asset portfolio is achieved approximately by some linear combination of the various

sources of funds, the profit can be explained by the composition of fund sources.[10] What we may expect is that the regulatory restriction preventing price competition for the funds will result in different marginal rates of return on these fund sources.

Let a_{ij} be the proportion of the jth fund source, S_j, put into the ith asset, A_i, in a bank's portfolio. Then

$$A_i = \sum_j a_{ij} S_j$$

$$\text{where } \sum_i a_{ij} = 1 \qquad \text{and } \begin{cases} i = CS, I, L \\ j = DD, TD, ND. \end{cases}$$

$$E = TR - TC$$

$$= \left[k_R + \sum_i (r_{Ai} - C_{Ai} + C_{Ai}^{IL}) A_i \right] - \left[k_C + \sum_j (r_{Sj} + C_{Sj} + C_{Sj}^{SV}) S_j \right]$$

$$= (k_R - k_C) + \sum_j \left[\sum_i (r_{Ai} - C_{Ai} - C_{Ai}^{IL}) a_{ij} - (r_{Sj} + C_{Sj} + C_{Sj}^{SV}) \right] S_j$$

$$= (k_R - k_C) + \sum_j e_j S_j$$

where k_R, k_C : constants,

$e_j = \sum_i (r_{Ai} - C_{Ai} - C_{Ai}^{IL}) a_{ij} - (r_{Sj} + C_{Sj} + C_{Sj}^{SV})$: marginal profit of the jth fund source,

r_{Ai}, C_{Ai}, C_{Ai}^{IL} : interest, handling cost, and illiquidity cost, respectively, per dollar holdings of the ith asset, and

r_{Sj}, C_{Sj}, C_{Sj}^{SV} : interest or other payment, handling cost, and net cost of providing non-conventional services, respectively, associated with one dollar of the jth fund source.

With the assumed fixed a_{ij} for given interest rates on assets and cost levels, an unregulated profit-maximizing bank will adjust r_{Sj}, and thus S_j, such that $e_{DD} = e_{TD} = e_{ND}$.

On the other hand, when price regulation is imposed, r_{Sj} is no longer a free decision variable, and the equalization of marginal profit for various fund sources may not be achieved. In other words, with regulation, the composition of fund sources matters in explaining bank earnings. Thus, the following profit equation is estimated.

$$E/A_V = f \text{ (composition of fund sources, bank organization, market structure).}$$

However, from the above marginal profit (e_j) equation, profit-maximizing banks will adjust the costs associated with obtaining funds from various sources as long as the marginal profit from the cost change is positive. Therefore, if commercial banks (constrained by the price regulation) can and do explore their profit opportunities by sufficiently increasing some expenses in the form of non-price rivalry, we have no reason to expect that the marginal rates of return will differ from one another.

IV. Data, Variables and Empirical Findings

The Data

The basic data used in this study are from the reports of condition and income of all the commercial banks in Massachusetts and New Hampshire. These reports have been provided by the Comptroller of the Currency, the Federal Deposit Insurance Corporation and the Federal Reserve Bank of Boston. Reports of income were for the calendar year 1973, and reports of condition were collected as of the end of 1972, June 30, 1973, and the end of 1973.

Massachusetts is a limited branching state and unit banking is dominant in New Hampshire, while all other New England states employ

statewide branching policy. Since statewide branching banks are operating in more than one distinct local market, the structure-performance correspondence is conceptually obscure and complicate. That's why only Massachusetts and New Hampshire banks are considered. Of the total 221 commercial banks, 191 banks have been taken, excluding those that had no time & savings deposit liability, or had great change in their demand deposit, time & savings deposit or loan outstanding, due to the relatively short history of business or for some other reason.[11] For the market data, the Bank Directory of New England, 1973, the National Shawmut Bank of Boston, and the Directory of American Savings and Loan Associations, 1974-75, T. K. Sanderson Organization, were the main sources.

Market Variables

N_B^T , N_F^T ; N_B^C , N_F^C ; N_B^S , N_F^S : number of commercial banks and thrift institutions in the town or city, county and SMSA, respectively,

CR_{DDi}^C , CR_{TDj}^C ; CR_{DDi}^S , CR_{TDj}^S : i-firm demand deposit concentration ratio (in per cent) and j-firm time & savings deposit concentration ratio for county and SMSA market, respectively, where i = 1,2,3 and j = 2,3,4,

NQ_{DD}^C , NQ_{TD}^C ; NQ_{DD}^S , NQ_{TD}^S : 'numbers-equivalent' for demand deposit and time & savings deposit services in county and SMSA market, respectively,

DS_B^T , DS_F^T ; DS_B^C , DS_F^C ; DS_B^S , DS_F^S : density of commercial bank and thrift institution offices (commercial banks, mutual savings banks and savings & loan associations) for town or city, county and SMSA market, respectively, as defined on page 8,

UB^C ; UB^S : degree of urbanization measured by the per cent of urban population in the county and SMSA, respectively.

Bank Variables

TA : total assets in thousands of dollars,

BR : number of branch offices,

A_V : total available fund defined as total assets minus fixed assets in thousands of dollars,

I : Investment in securities in thousands of dollars,

L_{IC}, L_{RL}, L_{CD}, L_{IN}, L_O, L : Agricultural, industrial and commercial loans; real estate loans; credit card loans; installment payment loans; other loans; and total loans, respectively, in thousands of dollars,

DD, TD_S, TD_T, TD, D : demand deposits; savings deposits; time deposits; time & savings deposits; and total deposits, respectively, in thousands of dollars,

ND : non-deposit funds defined as total available funds minus total deposits in thousands of dollars (= A_V - D),

C_L : total estimated cost (in thousands of dollars) of making loans reflecting the loan composition, which will further be explained below (page 29),

MEM : dummy 1 for member banks of the Federal Reserve System, 0 for others,

$-r_{DD}$, r_{TD}, r_L : average service charge on demand deposits, average interest rate on time & savings deposits, and on loans, respectively, in per cent per annum,[12]

C_{LL}, C_{LQ} : loan loss costs (provision for loan losses or actual net loan losses); net liquidity costs (net purchases of federal funds and net sales of securities under agreements to repurchase), respectively, in thousand dollars,

TC^*, TC^{**} : total operating costs other than interest (on deposits and borrowed money), occupancy and furniture & equipment costs; total operating costs net of interest, occupancy, furniture and equipment and loan loss costs, respectively, in thousands of dollars,

E, E^* : operating earnings before tax; operating earnings before tax which might have been achieved without loan loss, liquidity, occupancy and furniture & equipment costs, respectively, in thousands of dollars.

Empirical Findings

(1) Market Features

Before presenting the estimated performance equations, (Table 2) shows how market structure variables are correlated. Even though concentration ratios indicate only one point of the whole firm size distribution, the ratios for different number of firms show high correlation with one another, especially in time & savings deposit service. Thus, only two-firm demand deposit, and three-firm time & savings deposit concentration ratios are employed in the estimation of the equations. Concentration ratios are also highly correlated inversely with the 'numbers-equivalent'. The regression results have turned out to be fairly similar when one is compared to the other in terms of magnitudes of coefficients, t-values or R^2. Therefore, equations with 'numbers-equivalent' are not presented.

The number of sellers in a market is strongly correlated inversely with the concentration ratio, while the density of banking outlets has very weak inverse relation with the concentration ratio (no such relation existing for time & savings deposit markets of counties). More highly urbanized counties tend to have lower concentration ratios and more deposit outlets, especially for time & savings deposit service. However, for SMSA markets where mean urbanization ratio is very high with very low deviation, more highly urbanized SMSA's tend to have higher time & savings deposit concentration ratios.[13]

(2) Interest Rates on Deposits

Bank size has been found to have a great impact on the average deposit interest rates. This result casts doubt on the validity of the

(Table 2) Simple Correlation Coefficients between Market Variables

(a) For 24 County Markets

	N_B^C	CR_{DD1}^C	CR_{DD2}^C	CR_{DD3}^C	NQ_{DD}^C	DS_B^C	UB^C
CR_{DD1}^C	-0.534						
CR_{DD2}^C	-0.653	0.899					
CR_{DD3}^C	-0.722	0.786	0.953				
NQ_{DD}^C	0.851	-0.759	-0.873	-0.925			
DS_B^C	0.083	-0.205	-0.189	-0.230	0.141		
UB^C	0.602	-0.451	-0.454	-0.417	0.407	-0.060	
Mean	9.54	36.9	58.4	72.5	5.13	1.04	43.6
Standard Deviation	7.19	19.2	20.5	19.2	3.01	0.31	25.2

	N_F^C	CR_{TD2}^C	CR_{TD3}^C	CR_{TD4}^C	NQ_{TD}^C	DS_F^C	UB^C
CR_{TD2}^C	-0.757						
CR_{TD3}^C	-0.817	0.976					
CR_{TD4}^C	-0.842	0.940	0.988				
NQ_{TD}^C	0.936	-0.781	-0.844	-0.864			
DS_F^C	0.054	0.047	0.054	0.028	-0.076		
UB^C	0.675	-0.749	-0.749	-0.758	0.539	0.015	
Mean	26.1	43.5	55.1	63.6	10.4	1.03	43.6
S.D.	25.1	20.2	21.6	22.9	8.9	0.28	25.2

(Table 2 cont.) Simple Correlation Coefficients between Market Variables

(b) For 13 SMSA Markets

	N_B^S	CR_{DD1}^S	CR_{DD2}^S	CR_{DD3}^S	NQ_{DD}^S	DS_B^S	UB^S
CR_{DD1}^S	-0.373						
CR_{DD2}^S	-0.627	0.870					
CR_{DD3}^S	-0.886	0.655	0.877				
NQ_{DD}^S	0.807	-0.802	-0.942	-0.963			
DS_B^S	0.180	-0.365	-0.191	-0.178	0.208		
UB^S	-0.361	-0.221	0.086	0.264	-0.122	0.555	
Mean	12.5	49.0	76.0	89.1	3.16	0.97	78.2
Standard Deviation	17.0	15.8	16.4	12.1	1.41	0.24	5.6

	N_F^S	CR_{TD2}^S	CR_{TD3}^S	CR_{TD4}^S	NQ_{TD}^S	DS_F^S	UB^S
CR_{TD2}^S	-0.657						
CR_{TD3}^S	-0.695	0.979					
CR_{TD4}^S	-0.738	0.932	0.981				
NQ_{TD}^S	0.980	-0.772	-0.801	-0.830			
DS_F^S	0.192	-0.320	-0.317	-0.310	0.239		
UB^S	-0.405	0.634	0.642	0.674	-0.464	0.065	
Mean	34.0	42.4	56.8	67.4	9.06	0.96	78.2
S.D.	56.7	13.0	17.0	18.9	7.97	0.17	5.6

'market share hypothesis'. Large banks, instead of being short-run profit maximizers, seem to share the benefit of scale economies with their deposit customers.[14] To some extent, a large bank size may be the result of offering attractive rates on deposits.

Market power of banks with many branch offices has been confirmed for the average service charge on demand deposits. Such association is not significant for the interest rate on time & savings deposits. It is probably due to the restriction on the maximum rates payable on these deposits.

Density of banking outlets which are thought to indicate the extent to which rival banks compete for customers, seems to have some effect on the deposit interest rates only for the town or city markets. This should not be interpreted as indicating that the relevant deposit market area is town or city boundaries. Rather it suggests that the density estimated for the county or SMSA market is too crude to capture the strength of demand faced by individual banks. Even the town or city banking density variable is not significant for SMSA banks only. It may be due to the higher urbanization, higher mobility and more banking outlets in SMSA markets which tend to make the demand force felt by individual banks be rather nebulous.

Demand deposit concentration ratio has, contrary to the expectation, an insignificant negative effect on the level of service charge for both county and SMSA markets. On the other hand, average service charge on demand deposits is significantly influenced negatively by the number of commercial banks in the town or city market. This seems to suggest that

(Table 3) Average Service Charge on Demand Deposits($-r_{DD}$)

(a) For All Banks (N = 191)

Constant	2.377 (6.76)	2.549 (3.21)	2.912 (9.02)
Log (TA)	-0.176 (-4.45)	-0.162 (-4.08)	-0.243 (-6.96)
Log (BR)	0.150 (3.36)	0.143 (3.15)	0.200 (4.63)
Log (DS_B^T)	0.067 (2.06)		0.071 (2.09)
Log (DS_B^C)		-0.030 (-0.31)	
N_B^T	-0.025 (-3.24)	-0.025 (-3.05)	
Log (CR_{DD}^C)			-0.008 (-0.18)
	$R^2 = 0.275$	$R^2 = 0.259$	$R^2 = 0.235$

(b) For SMSA Banks Only (N = 114)

Constant	2.529 (5.94)	2.563 (2.42)	3.043 (7.82)
Log (TA)	-0.196 (-4.40)	-0.196 (-4.37)	-0.268 (-7.20)
Log (BR)	0.180 (3.67)	0.180 (3.64)	0.244 (5.46)
Log (DS_B^T)	0.060 (0.91)		0.093 (1.40)
Log (DS_B^S)		0.014 (0.09)	
N_B^T	-0.021 (-2.57)	-0.022 (-2.78)	
Log (CR_{DD}^S)			-0.046 (-0.50)
	$R^2 = 0.418$	$R^2 = 0.413$	$R^2 = 0.382$

(Table 4) Average Interest Rate on Time & Savings Deposits (r_{TD})

(a) For All Banks

$TD_{S/TD}$	2.89	(4.37)	2.46	(3.81)	1.89	(1.38)	4.35.	(52.1)
$TD_{T/TD}$	4.47	(8.25)	3.86	(5.27)	3.46	(2.47)	6.38	(54.5)
							R^2 = 0.385	
Constant							-1,032	(-1.61)
Log (TA)	0.249	(3.95)	0.338	(5.76)	0.236	(3.70)	0.221	(3.54)
Log (BR)	-0.110	(-1.60)	-0.138	(-2.06)	-0.106	(-1.51)	-0.084	(-1.22)
Log (TD/D)	-0.204	(-1.93)	-0.261	(-2.68)	-0.187	(-1.74)	-0.282	(-2.78)
Log (DS_F^T)	-0.141	(-2.39)	-0.055	(-0.85)			-0.145	(-2.44)
Log (DS_F^C)					0.135	(0.82)		
Log (N_F^T)	0.071	(1.41)			0.055	(1.02)	0.037	(0.77)
Log (CR_{TD}^C)			0.167	(2.22)				
	R^2 = 0.544		R^2 = 0.578		R^2 = 0.532		R^2 = 0.531	

(b) For SMSA Banks Only

$TD_{S/TD}$	2.21	(2.52)	2.28	(2.70)	3.13	(1.29)	4.20	(40.2)
$TD_{T/TD}$	4.06	(4.10)	4.13	(4.30)	4.97	(2.01)	6.73	(50.3)
							R^2 = 0.561	
Constant							-1.131	(-1.34)
Log (TA)	0.270	(3.34)	0.312	(4.40)	0.274	(3.39)	0.201	(2.53)
Log (BR)	-0.099	(-1.18)	-0.132	(-1.69)	-0.103	(-1.23)	-0.046	(-0.54)
Log (TD/D)	-0.126	(-0.82)	-0.186	(-1.25)	-0.134	(-0.88)	-0.204	(-1.31)
Log (DS_F^T)	-0.063	(-0.47)	-0.050	(-0.40)			-0.115	(-0.85)
Log (DS_F^S)					-0.148	(-0.44)		
Log (N_F^T)	0.249	(0.35)			0.035	(0.51)	-0.029	(-0.42)
Log (CR_{TD}^S)			0.207	(2.44)				
	R^2 = 0.680		R^2 = 0.698		R^2 = 0.680		R^2 = 0.655	

the relevant market area for demand deposit service does not reach out beyond the town or city boundaries.

Surprisingly, a higher time & savings deposit concentration ratio has turned out to be associated with significantly higher average interest rate on these deposits, even after the different deposit composition is taken into account. The unexpected sign is not easily explainable. It may partly reflect the usually longer maturities of time & savings deposit accounts in rural banks in highly concentrated markets. And, quite possibly, the time and savings deposit concentration ratio may pick up the competitive relationship with relatively large mutual savings banks.[15]

Furthermore, the number of thrift institutions in the town or city has an only weak positive effect on the average interest rate on time & savings deposits. It seems that the regulation of maximum deposit rate is binding on the pricing decision of commercial banks such that the determination of the rate is not sensitive to the market structure.[16]

(3) Interest Rate on Loans

The loan composition has a significant influence on the average interest rate on loans. The estimated coefficients of loan types are quite close to the actual average loan rates, as shown in (Table 6). Reflecting huge processing expenses and activity-franchise fees, the average interest rate on credit card loans is much higher than that on other types of loans. Installment loans carry higher interest rates, obviously, due to the risk involved and the retail characteristics, than real estate mortgage loans do. Agricultural, industrial, commercial and other loans in (Table 6) have been disaggregated into L_{IC} and L_{O} in the

(Table 5) Average Interest Rate on Loans (r_L)

	(a) For All Banks			(b) For SMSA Banks Only		
$L_{IC/L}$	9.76 (5.24)	8.60 (4.94)	8.46 (43.4)	7.93 (2.12)	8.50 (2.19)	8.58 (32.8)
$L_{RL/L}$	8.11 (4.23)	6.70 (3.89)	7.45 (41.4)	6.19 (1.56)	6.34 (1.58)	7.34 (21.0)
$L_{CD/L}$	16.19 (5.65)	14.95 (5.21)	16.10 (7.94)	14.72 (3.09)	14.11 (3.02)	16.50 (6.6)
$L_{1N/L}$	11.24 (6.12)	9.86 (6.00)	9.80 (34.0)	9.90 (2.64)	10.26 (2.66)	9.99 (22.9)
$L_{O/L}$	7.86 (4.14)	6.74 (3.76)	6.39 (18.0)	5.09 (1.35)	5.78 (1.47)	5.65 (11.8)
			$R^2 = 0.301$			$R^2 = 0.360$
Constant			1.937 (1.07)			1.086 (0.31)
Log (TA)	-0.116 (-1.47)	-0.060 (-0.83)	-0.128 (-1.66)	-0.038 (-0.34)	0.026 (0.27)	-0.070 (-0.66)
Log (BR)	0.175 (1.94)	0.129 (1.50)	0.173 (1.94)	0.075 (0.63)	0.030 (0.27)	0.081 (0.69)
Log (TD/D)	0.619 (3.79)	0.659 (4.05)	0.409 (3.27)	0.776 (2.93)	0.888 (3.29)	0.634 (2.96)
Log (DS_F^C)	-0.363 (-1.67)	-0.262 (-1.24)	-0.350 (-1.64)			
N_F^T	0.007 (1.65)		0.010 (2.45)	0.008 (1.44)		0.009 (1.96)
Log (CR_{TD}^C)		0.029 (0.31)				
Log (DS_F^S)				-0.289 (-0.58)	-0.515 (-0.94)	-0.421 (-0.88)
Log (CR_{TD}^S)					-0.198 (-1.39)	
	$R^2 = 0.383$	$R^2 = 0374$	$R^2 = 0365$	$R^2 = 0446$	$R^2 = 0.445$	$R^2 = 0.433$

(Table 6) Average Interest Rates on Loans (in per cent)

	56 New England Banks with Deposits up to $60 millions	557 U.S. Banks with Deposits up to $60 millions
Real Estate Mortgage Loans	7.41	7.51
Credit Card Loans	14.76	18.12
Installment Loans	10.70	10.73
Agricultural, Industrial, Commercial, and Other Loans	8.15	7.97

Source: Functional Cost Analysis, New England Bank Comparative Study, 1973-1972, Federal Reserve Bank of Boston

loan rate equations in (Table 5). As shown by very low coefficients for L_0 which include loans to other financial institutions, security brokers and dealers, single-payment loans to individuals, and unsecured loans to hospitals, charitable or educational institutions, they usually carry very low interest rates thanks to the unquestionable credit standing of the borrowers. For all the sample banks, 30 per cent of the variance in average loan rate is explained by the loan composition alone, and 36 per cent for the SMSA banks only.

Meanwhile, other variables including bank organization and market structure variables explain no more than 10 per cent of the variance in average loan rate. The proportion of time & savings deposits in total deposits has a strong impact on the average loan rate, indicating that banks charge higher loan rate when they have to pay heavy interests on

deposits. The market power of banks with many branch offices or of banks in low banking density markets, has not been found significant, even though it might be difficult to deny the existence at least for county markets.

Bank size and deposit concentration ratios also have no discernible effect on the loan rate. Finally, it is puzzling to find marginally significant positive association between loan rate and the number of thrift institutions in the town or city market. It seems to suggest no price competition in loan markets, even though banks are free to set prices. Commercial banks might be more concerned with the steady and favorable relationship with loan customers rather than exploiting them in the short-run. Thus, their pricing policy on loans might be simply covering, with some reasonable profit, the cost of funds they incur in the deposit and capital markets. Then, banks in a competitive market with many rivals who pay higher interest rates to attract deposit customers may also charge higher interest rates on loans of the same risk level.

(4) Operating Costs

Significant negative coefficients of bank size and positive coefficients of the number of branch offices strongly support large economies of scale and the expensiveness of branch banking.

Different sources and uses of the available funds are associated with different levels of handling and other costs. The regression results show that time & savings deposits are much less costly to service than demand deposits or non-deposit sources of funds, obviously reflecting the lower handling costs. When we look at only SMSA banks, the costs of obtaining non-deposit funds are remarkably high. This seems to indicate

that SMSA banks, generally facing more competitive pressures and, at the same time, strict regulations in deposit markets, are forced to turn to the non-deposit fund markets.

Since the constant term is suppressed because of the singularity of matrix, that is, $(DD + TD + ND)/A_V = 1$, the absolute magnitudes of coefficients of the fund source variables and their t-values are necessarily unstable. What we are concerned with are only the differences in the magnitudes of coefficients and the stability of the differences.

Asset composition has also turned out to be a significant factor determining operating costs. The cost associated with one dollar of security investments is lower than that of loans. To take into account the loan composition, instead of including all the loan types as explanatory variables, an estimated cost of making loans (C_L) is employed to avoid multicollinearity problem. If we assume that commercial banks make the same rate of profit for each type of loans, the differences in the loan making costs will exactly be reflected in the average interest rates on each type of loans. From (Table 5), the estimation of loan rate equation explained only by loan composition for all sample banks has turned out to be

$$r_L = 8.46\ (^{L_{IC}}/_{L}) + 7.45\ (^{L_{RL}}/_{L}) + 16.10\ (^{L_{CD}}/_{L}) + 9.80\ (^{L_{IN}}/_{L}) + 6.39\ (^{L_{O}}/_{L})$$

From this, the loan making cost is estimated as

$$C_L = (r_L - 6.39)\ L\ -(16.10 - 6.39)L_{CD} = (8.46 - 6.39)L_{IC} + (7.45 - 6.39)L_{RL} + (9.80 - 6.39)L_{IN}$$

(Table 7) Ratio of Operating Costs to the Available Funds

(a) For All Banks				(b) For SMSA Banks Only		
Dependent Variables	$100 \cdot TC^*/A_V$	$100 \cdot TC^*/A_V$	$100 \cdot TC^{**}/A_V$	$100 \cdot TC^*/A_V$	$100 \cdot TC^*/A_V$	$100 \cdot TC^{**}/A_V$
DD/A_V	5.58 (2.84)	0.15 (-0.08)	5.64 (3.23)	5.26 (1.56)	5.30 (1.36)	5.03 (1.61)
TD/A_V	3.44 (1.76)	-2.30 (-1.25)	3.66 (2.10)	3.99 (1.18)	4.02 (1.02)	3.61 (1.15)
ND/A_V	5.62 (2.58)	0.60 (0.28)	5.70 (2.95)	11.34 (3.16)	12.29 (3.01)	10.02 (3.00)
I/A_V	-1.63 (-2.51)	-1.77 (-2.65)	-1.58 (-2.74)	-1.55 (-1.86)	-1.67 (-1.87)	-1.52 (-1.98)
L_{CD}/A_V	14.68 (3.59)	9.29 (2.15)	13.69 (3.76)	18.18 (4.04)	14.58 (3.06)	15.63 (3.73)
C_L/A_V	0.919 (4.20)	0.929 (2.15)	0.653 (3.36)	0.679 (2.45)	0.467 (1.64)	0.408 (1.58)
Log (TA)	-0.489 (-5.32)	-0.238 (-2.99)	-0.457 (-5.59)	-0.652 (-5.80)	-0.457 (-4.48)	-0.568 (-5.43)
Log (BR)	0.294 (3.06)	0.145 (1.52)	0.311 (3.64)	0.388 (3.40)	0.274 (2.39)	0.387 (3.64)
Log (DS_F^C)	0.280 (1.18)	0.777 (3.30)	0.243 (1.16)			
Log (N_F^T)	0.393 (5.15)		0.304 (4.48)	0.345 (3.51)		0.233 (2.55)
Log (CR_{TD}^C)		-0.456 (-4.41)				
Log (DS_F^S)				0.458 (0.99)	0.274 (0.50)	0.430 (1.00)
Log (CR_{TD}^S)					-0.166 (-1.10)	
	$R^2 = 0.493$	$R^2 = 0.474$	$R^2 = 0.484$	$R^2 = 0.474$	$R^2 = 0.414$	$R^2 = 0.430$

(Table 8) Ratios of Loan Loss and Net Liquidity Costs to the Available Funds

For All Banks

Ratio of Loan Loss Cost ($^{100C}_{LL/A_V}$)			Ratio of Net Liquidity Cost ($^{100C}_{LQ/A_V}$)		
Constant	0.013 (0.02)	-1.253 (-2.25)	Constant	-3.573 (-3.24)	-2.432 (-2.30)
Log (TA)	-0.033 (-1.13)	0.009 (0.37)	Log (TA)	0.309 (5.62)	0.270 (6.16)
Log (BR)	-0.010 (-0.32)	-0.046 (-1.51)	Log (BR)	-0.104 (-1.84)	-0.071 (-1.30)
$(L_{IC}+L_{IN})/A_V$	0.724 (4.87)	0.769 (5.28)	L/A_V	1.985 (6.52)	2.039 (6.96)
Log (DS^C_F)	0.029 (0.37)	0.151 (2.06)	TD/A_V	-0.783 (-3.28)	-0.790 (-3.39)
Log (N^T_F)	0.070 (2.91)		MEM	0.104 (1.72)	0.092 (1.53)
Log (CR^C_F)		-0.117 (-3.69)	Log (DS^C_F)	-0.090 (-0.66)	-0.202 (-1.50)
			Log (N^T_F)	-0.065 (-1.33)	
			Log (CR^C_F)		0.119 (1.95)
	R^2 = 0.179	R^2 = 0.201		R^2 = 0.515	R^2 = 0.521

Even though the other type of loans (L_O), mostly loans to financial institutions, security dealers and single payment loans to individuals) is not cost-free, C_L will fully incorporate the differential cost effects of the loan mix. Credit card loans are treated separately noting that, in this development period, banks usually incur net loss with this type of loan.

Annual operating costs other than interest, occupancy, and furniture & equipment costs, as a percentage of total available funds is significantly affected by the market structure. The more thrift institutions in a town or city and the lower deposit concentration ratio a county or SMSA market has, the more costs the banks incur, though the concentration ratio for SMSA banks and the density of banking outlets have no significant effects. This result seems to suggest the significance of non-price competition. To make sure, more cost equations are estimated. Our operating costs TC^* include wages & salaries, loan losses, liquidity costs and other costs except for interest, occupancy, and furniture & equipment costs. Of these costs, loan losses and liquidity cost are estimated separately in (Table 8).

Loan losses (C_{LL}) are significantly influenced by the market structure as well as by the proportion of funds held in risky loans (agricultural, industrial, commercial and installment loans, $L_{IC} + L_{IN}$). On the other hand, liquidity cost (C_{LQ}, net purchases of federal funds and net sales of securities under agreements to repurchase) has, interestingly, an insignificant negative association with the competitiveness of market. Now, to check whether or not the significant impact of market structure on operating costs TC^* is just due to the higher loan losses in competitive markets, another cost equation TC^{**} is estimated, where

$TC^{**} = TC^{*} - C_{LL}$. The results in (Table 7) still show strong influence of market structure on TC^{**}. Thus, we may conclude that commercial banks in a competitive market tend to incur higher operating costs associated with higher service quality, advertising and provision of non-conventional services. Furthermore, to check whether or not the higher operating costs in a competitive market just come from higher wage rate, this variable measured as annual average wages and salaries per worker has been included in all the cost equations, though not presented in the tables. The coefficients have in each case turned out to be insignificant.

(5) Profit Rate

All the impacts of market structure on pricing and cost incurring decisions ultimately end up with varying profit rates. For all the sample banks, the profitability is strongly affected by the number of competing thrift institutions in the town or city market. However, the deposit concentration ratio is significant only for county markets.

Coefficients of different sources of funds show that demand deposits are the most profitable source, while, time deposits are the least profitable source. This result indicates that the regulatory constraint prohibiting interest payment on demand deposits is really binding on the banking operation, suggesting also that non-price competition is not carried on intensely enough to nullify the differential regulatory constraints on the interest rates payable on different deposits. However, this result should not be interpreted as indicating that non-deposit funds are more profitable for a bank than time & savings deposits, since, in the non-

(Table 9) Ratio of Earnings Before Tax to the Available Funds

Dependent Variables	(a) For All Banks			(b) For SMSA Banks Only		
	$100E/A_V$	$100E/A_V$	$100E^*/A_V$	$100E/A_V$	$100E/A_V$	$100E^*/A_V$
DD/A_V	0.75 (0.45)	4.92 (3.06)	-2.07 (-1.31)	-0.50 (-0.16)	-0.22 (-0.06)	-4.67 (-1.76)
TD_{S/A_V}	-1.14 (-4.22)	3.55 (-3.10)	-3.80 (-4.01)	-2.35 (-2.78)	-1.76 (-2.24)	-6.21 (-2.68)
TD_{T/A_V}	-1.58 (-4.97)	2.57 (-4.84)	-4.98 (-6.45)	-3.61 (-4.86)	-3.43 (-4.68)	-8.51 (-6.97)
ND/A_V	-0.04 (-0.92)	3.75 (-1.34)	-2.48 (-0.49)	-1.59 (-0.75)	-1.86 (-1.09)	-3.35 (1.06)
$(L_{IC}+L_{IN})/A_V$	-1.53 (-3.70)	-1.57 (-3.68)	0.46 (1.17)	-1.35 (-2.58)	-1.15 (-2.11)	1.11 (2.48)
L_{CD/A_V}	-7.45 (-2.11)	-3.87 (-1.04)	-2.07 (-0.61)	-5.41 (-1.31)	-2.89 (-0.68)	2.85 (0.80)
Log (TA)	0.251 (2.98)	0.075 (0.98)	0.468 (5.77)	0.235 (2.14)	0.108 (1.06)	0.343 (3.65)
Log (BR)	-0.192 (-2.23)	-0.094 (-1.08)	-0.182 (-2.19)	-0.188 (-1.72)	-0.116 (-1.06)	-0.103 (-1.09)
Log (DS_F^C)	-0.001 (-0.01)	-0.405 (-1.96)	0.056 (0.28)			
Log (N_F^T)	-0.318 (-4.80)		-0.338 (-5.29)	-0.237 (-2.68)		-0.171 (-2.26)
Log (CR_{TD}^C)		0.301 (3.34)				
Log (DS_F^S)				0.187 (0.44)	0.261 (0.53)	0.503 (1.37)
Log (CR_{TD}^S)					0.083 (0.62)	
	$R^2 = 0.295$	$R^2 = 0.248$	$R^2 = 0.388$	$R^2 = 0.301$	$R^2 = 0.252$	$R^2 = 0.525$

Note: The t-values for variables TD_{S/A_V}, TD_{T/A_V} and ND/A_V are adjusted in such a way as to test the null hypothesis that marginal returns on these fund sources are the same as that on demand deposits.

deposit funds, part of the capital account is included (as much as capital minus fixed assets).

Large banks are more profitable than small banks even after they transfer part of their scale economies in the form of favorable interest rates to deposit customers. The tendency of greater market power enjoyed by branch banks seems to be more than offset by the expensiveness of branch banking, resulting in a net negative impact on profitability.

Loan composition has also turned out to be an important factor determining profitability. The result shows that risky loans including agricultural, industrial, commercial and installment loans have significant negative effects on the profitability. If it had not been for loan losses, risky loans would have had positive effects on profit rate, suggesting either that banks have not properly priced different types of loans incorporating the risk factors involved, or that the year 1973 was a bad year for risky loans.

V. Summary and Conclusions

This paper has tried to analyze the relations between market structure and the performance of commercial banks under the existing regulatory constraints. Due consideration has been given to the fact that commercial banks are multi-product firms and that to each line of commerce a different geographical market corresponds.

Most empirical studies in this field have failed due to the arbitrariness of market delineation, crudeness of market structure measures, and the incomplete formulation of the performance equations.

In this paper, alternative measures of market structure and alternative market delineations are tried for each line of business to avoid errors. In counting number of firms or calculating concentration ratio or 'numbers-equivalent', not only commercial banks but also other thrift institutions are included. Furthermore, noting the regulatory constraints on the interest rates payable on deposits, the existence and the extent of non-price competition has been tested.

Evidence of price competition has been found significant only in demand deposit service. It suggests that the Regulation Q has made the interest rates on time & savings deposits insensitive to market structure, and that the rates in a deposit market tend to spill over into the corresponding loan market. Interdependence between deposit and loan rates or, at least, no association between interest rates on loans, the major source of bank income, and the market structure seems to suggest that commercial banks are not short-run profit maximizers and/or that what is really going on is non-price competition. Existence of non-price rivalry is demonstrated in the estimated cost equations. Banks in a competitive market who cannot lower loan rates because of narrow earnings and are actually eager to make more money, seem to hold more money in loans, especially, in risky loans, resulting in more loan losses. These banks also tend to incur more operating costs associated with advertising, higher service quality and provision of non-conventional services.

Among the alternative measures of market struture, the number of firms in the town or city market seems to provide the best explanation. This does not necessarily mean that the relevant market area is the town

or city boundaries. Rather, the estimation of structure for county or SMSA markets seems to be so crude that counting rival sellers in more contiguous area is a better estimate of the competitiveness of market felt by individual banks. Concentration ratios, widely used in industrial organization studies, have turned out to have virtually no impact on price competition, but to have significant influence on the non-price rivalry. This result is perhaps not surprising in light of the preoccupation of the regulatory authorities with the concentration ratios.

A basic question has sometimes been raised whether the market structure really matters. The results in this paper supports the belief that it surely matters even though the regulatory constraints seem to have reduced the sensitivity of the banking performance to the market structure.

Thus, it seems clear that when the price regulation is removed and freer entry by new or existing institutions is allowed, the price competition will become more visible. Inefficient banks will have no way but to fail. Freer entry combined with statewide branching will inevitably lead to a higher concentration and, ultimately, to a monopoly in many markets, as long as the gain from scale economies and market power associated with branch banks exceeds the cost disadvantage of branch banking. Even though, with the vigilance of the regulatory authority in this direction, concentration does not matter much, it may not be the case within a different set of regulatory framework. Thus, the antitrust laws may have to be applied to prevent monopolizing attempts or other restraints of commerce which reduce competition substantially.

The question of whether a reformulation of regulation with emphasis on consumer protection would bring about a net gain to the society or not, will, in a large part, depend on how the cost of bank failures can be minimized through public policy measures. One more aspect of the problem is whether or not the resulting market structure will be effective in servicing small individual savings. If profit drive forces banks to concentrate only on profitable markets and neglect others, it may result in net loss in social welfare.

Footnotes

1. See Donald Jacobs, "The Framework of Commercial Bank Regulation: An Appraisal", The National Banking Review, March 1964.

2. Restriction of entry is mainly to protect the existing banks from failure by increasing profitability. The intent for price regulation, in the form of the Regulation Q and prohibition of interest payment on demand deposits, was also largely to lower operating costs and, thus, to increase profitability. Regulations on asset and liability portfolio act, in general, to lower risky exposure and, thus, to reduce losses on loans and investments. This form of regulation may be viewed as a price banks should pay to the regulatory authority for the entry restriction and input price regulation. Restriction on branching cannot be explained by the producer protection argument. Rather, it seems to be geared by the idea of the protection of local economic interests, and the undesirability of exorbitant capital concentration in a few hands.

3. The Report of the President's Commission on Financial Structure and Regulation, December 1971.

4. (6) (7) (11) (14) (15) (17) (18) (25) and (28) were the major studies reviewed for this paper. Of these, (11) and (17) defined the market as county boundaries, while (6) (7) (18) and (28) took SMSA's as distinct markets. (15) concentrated on isolated towns with one or two commercial banks. (6) tested the effects of state deposit concentration ratio for the statewide branching states. None of this literature distinguished the markets for different lines of banking business.

5. When authors talk about a regional market or regional location, they seem to refer to a geographical market area broader than a state boundary. Almarin Phillips (21) divided his samples into two regions, eastern and southern cities, and northern and western cities, while Flechsig (10) employed dummy variables for four regional groupings. Haslem and Longbrake (13) used 12 Federal Reserve Districts as their separate regions.

6. (6) (7) (11) (14) (17) and (28) employed total deposit concentration ratios (one-, two-, or three-firm concentration ratios) as their market structure variables. (18) was the only one that constructed separate concentration ratios for different lines of business (demand deposits, and time & savings deposits). (11) (15) and (28) also took into account the existence or the number of savings & loan associations in the market, but did not include mutual savings banks. (15) and (17) included the number of commercial banks in the market structure variables. (25) was the only study that incorporated the competition from savings & loan associations and mutual savings banks as well as from other commercial banks. However, what was tested was the 'market share hypothesis' and only market share of individual banks was considered, not the concentration ratio or number of institutions in the market.

7. Since the two demand factors, population and urbanization, are not supposed to work independently in determining the demand, a linear equation seems inappropriate. When a linear equation was tried, the fit was much poorer than that of Cobb-Douglas type equation employed here.

8. The limit price model developed independently by Bain (2) and Sylos-Labini (26) in the late 1950s, centers on barriers to entry. This model predicts that the established firms in an oligopolistic market will set prices at a level below the joint profit-maximizing price, or below the pure monopoly price under the assumed collusion among the established firms. More specifically, they will select an entry-deterring or limiting price. Unit banks, facing more potential injury from rival entry, may set limit prices, while branch banks may not particularly worry about new entries.

9. All of the empirical literature reviewed, employed prices of banking services or profit rate or both as their performance variables. (7) (11) (15) and (17) also estimated the ratio of time & savings deposits to total deposits and/or the ratio of loans to total deposits or total assets.

10. "Asset Allocation" approach advanced by Fred G. DeLong (4) rests on a basic principle that investments in various asset categories should be directly related to the sources from which funds were obtained. The fundamental criterion used to earmark funds is that the velocity of the source of the funds dictates the appropriate maturity of the asset which they should be used to support. Even though "Asset Allocation" may incorporate unnecessary restrictions and ignors some of the dynamic considerations, this approach to asset management has had great appeal among the people in the banking business and is considered as the basic principle to be understood to be able to use more sophisticated techniques. Thus, as a first approximation, this assumption seems quite realistic.

11. 15 New Hampshire banks were excluded because they had no or less than 10 percent of the total deposits in time & savings deposits, while six other New Hampshire banks were excluded because they had no or less than 10 percent of the total deposits in demand deposits. The remaining nine banks (three New Hampshire banks and six Massachusetts banks) were excluded because their deposit or loan figures fluctuated wildly at the three time points looked at in this study.

12. Average interest rates and service charges are calculated by dividing the total interest or charges received by the bank during the year by the weighted average outstanding of the deposits or loans. Assuming that the outstanding balance has changed linearly between the observed time points, the middle-point (end of June, 1973) observation is given twice the weight as is given to the end-point (end of 1972 and end of 1973) observations. That is,

$$DD = 0.25\ (DD_{\text{end 1972}} + DD_{\text{end 1973}}) + 0.50 DD_{\text{June 1973}}$$

and, the same for TD and L.

13. These results seem to indicate that economies of scale are best achievable in highly urbanized areas. This may simply reflect the fact that, in highly urbanized areas, diseconomies of branch banking are relatively weak compared with the economies of scale. As an evidence, for 17 limited branching states, the average number of commercial bank offices per bank is significantly positively correlated with the degree of urbanization of the state.

$$N_{BO/NB} = \underset{(-3.03)}{-5.80} + \underset{(4.63)}{0.131}\ UB \qquad R^2 = 0.589$$

14. However, the significant positive coefficients of the bank size variable in the time and savings deposit rate equations are not coming solely from the economies of scale. Large banks usually hold more certificates of deposit (CD's) in their time & savings deposit liabilities. This makes the average time and savings deposit rate higher, since CD rate is higher than ordinary time deposit rates and, especially, the maximum interest rate on large-denomination CD has been lifted since May 1973.

15. In most of the Massachusetts counties (for New Hampshire banks only, the coefficient of concentration ratio was insignificant negative), the largest three institutions in time & savings deposit business are mutual savings banks. Only five commercial banks are included in the list of the largest three institutions in each county. Thus, for commercial banks, a high concentration in time & savings deposits may mean visible competition with a small number of prominent mutual savings banks, which forces commercial banks to pay higher interest rates on these deposits. When the two-bank concentration ratio in each county market is calculated based only on commercial banks (denoted as CR_{TD}^{C*} below), the coefficient is still positive but insignificant.

$$r_{TD} = \underset{(4.19)}{2.75}\ (^{TD}S/_{TB}) + \underset{(5.89)}{4.37}\ (^{TD}T/_{TD}) + \underset{(5.05)}{0.288}\ \text{Log (TA)}$$

$$\underset{(-1.83)}{-0.124}\ \text{Log (BR)} \underset{(-2.28)}{-0.233}\ \text{Log}\ (^{TD}/_{D}) - \underset{(-2.15)}{0.129}\ \text{Log}\ (DS_F^T)$$

$$+ \underset{(0.98)}{0.083}\ \text{Log}\ (CR_{TD}^{C*}) \qquad R^2 = 0.542$$

16. According to the survey of time and savings deposits by the Federal Reserve and the FDIC, as of April 30, 1973, 83 per cent of the issuing insured commercial banks in the Boston Federal Reserve District paid the ceiling rate on savings deposits and 97-98 per cent of the issuing banks paid the ceiling rates on various maturities of small-denomination time deposits. These percentages were slightly higher than those of the national total. On July 31, 1973, one month after the increase in the maximum interests in the Regulation Q, 64 per cent of the issuing insured

commercial banks all over the country paid the new ceiling rate (5.0 per cent, increased from the previous 4.5 per cent) on savings deposits, and 66-86 per cent of the banks paid new ceiling rates on various maturities of small-denomination time deposits.

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